REMARKS

Applicant has carefully reviewed and considered the Office Action mailed on February 13, 2003, and the references cited therewith.

Claims 3, 5, 8, 9, 11, 16, and 23 are amended, claims 1 and 2 are canceled, and claims 29-32 are added; as a result, claims 3-32 are now pending in this application.

As indicated above, Applicant has submitted a proposed drawing amendment with this response. The drawing amendment has support in the specification at least at page 5, lines 6-16.

Applicant has amended the specification to make reference to an element in the amended Figure (Figure 8).

§102 Rejection of the Claims

Claim 11 was rejected under 35 USC § 102(b) as being anticipated by Hall (ACM, pp. 296-306 (1992)). Applicant respectfully traverses this rejection because Hall does not anticipate the claimed invention, as set forth in amended independent claim 11. Anticipation requires the disclosure in a single prior art reference of each element of the claim under consideration. *In re Dillon* 919 F.2d 688, 16 USPQ2d 1897, 1908 (Fed. Cir. 1990) (en banc), cert. denied, 500 U.S. 904 (1991).

Amended independent claim 11 recites "combining the register values into a single set-value; and storing the occurrence frequency and the single set-value in a data structure." In contrast, the cited passage (Hall at pp. 296-306) describes several profiler types including count profilers, function profilers, call graph profilers, and trace profilers. Hall also teaches an approach to profiling called call path profiling, which resource usage of subroutine calls. However, Hall does not teach every element of claim 11 because it does not teach "combining" and "storing," as recited in claim 11. Therefore, Applicant respectfully submits that the cited reference does not teach each and every element of claim 11. As such, Applicant respectfully requests that this rejection be withdrawn and that claim 11 is in condition for allowance.

§103 Rejection of the Claims

Claims 1, 2, 5 and 8-10 were rejected under 35 USC § 103(a) as being unpatentable over Connors et al. (IEEE, pp. 158-169 (1999)) in view of Rodiger et al. (U.S. 5,960,198).

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The Examiner has the burden under 35 U.S.C. § 103 to establish a *prima facie* case of obviousness. *In re Fine*, 837 F.2d 1071, 1074, 5 USPQ2d 1596, 1598 (Fed. Cir. 1988). In order for the Examiner to establish a *prima facie* case of obviousness, three base criteria must be met. First, there must be some suggestion or motivation, either in the references themselves or in the knowledge generally available to one of ordinary skill in the art, to modify the reference or to combine reference teachings. Second, there must be a reasonable expectation of success. Finally, the prior art reference (or references when combined) must teach or suggest all the claim limitations. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *M.P.E.P.* § 2142 (citing *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed.Cir. 1991)).

Claims 1, 2, 5 and 8-10, which were rejected over Connors in view of Rodiger, have been canceled or amended as follows. Claims 1 and 2 have been canceled. Dependent claims 5 and 8 is amended to depend from amended claim 3, which is rewritten in independent form. Claims 9 and 10 are amended to include limitations similar to those of amended claim 3. Because dependent claims 5, 8, 9, and 10 include the limitations of or limitations similar to amended claim 3, Applicant submits that these claims are allowable for the reasons given below, in the discussion of amended claim 3.

Claims 3, 4, 6, 11, 12, 14 and 15 were rejected under 35 USC § 103(a) as being unpatentable over Connors et al. in view of Rodiger et al. and further in view of "Dictionary of Computing" (Oxford University Press (1996)).

In reference to claims 3 and 11, Applicant respectfully submits that the Office Action does not make a *prima facie* case of obviousness for at least the following three reasons.

Firstly, the cited references do not teach or suggest all the elements of amended claim 3. Connors teaches integrating compiler and architecture techniques to exploit value locality for regions of code. Connors also specifies an instruction set architecture that provides an interface for compilers to communicate reuse region information to the hardware. Rodiger teaches a controllable software profiler that is embedded in a target program for collecting profile information (e.g., branch history information). Rodiger's profiler is to be instrumented in

segments of the target program, where the profiler is invoked when a designated condition register is set to a predetermined value. The Dictionary of Computing teaches hashing. The Dictionary of Computing states that hashing is "A technique that is used for organizing tables to permit rapid searching or table lookup, and is particularly useful for tables to which items are added in an unpredictable manner..." The Dictionary of Computing further states, "Each item to be placed in the table has a unique key. To place it [the item] in the hash table a hash function is used, which maps the keys onto a set of integers (the hash values) that range over the table size." Dictionary of Computing at page 221.

Claim 3 recites "combining each of the input register values into a single value." In its rejection, the Office Action asserts that "combining each of the input register values into a single value" is "merely a key into hashing," citing the Dictionary of Computing, Fourth Edition at page 221. However, Applicant respectfully submits that the Office Action has incorrectly equated hash keys with the above-quoted limitation of claim 3. The Dictionary of Computing's definition of hashing teaches storing entries in a table, but it does not teach or suggest "for each set-value, combining each of the input register values into a single value." Because the Dictionary of Computing does not teach or suggest the "combining" of claim 3, the cited combination does not teach or suggest all the elements of amended claim 3.

Regarding amended independent claim 11, the Office Action admits that Connors does not teach periodically sampling registers to obtain register values, but asserts that Rodiger teaches sampling profilers (citing Rodiger at column 4 line 7) and that the Dictionary of Computing teaches "sampling" (citing Dictionary of Computing at p. 431, top right column). Independent claim 11 has been amended to recite "combining each of the input register values into a single value." As similarly discussed above with reference to claim 3, the combination of Connors, Rodiger, and Dictionary of Computing does not teach or suggest "combining," as recited in amended independent claim 11. Therefore, the cited combination does not teach or suggest every element of amended independent claim 11. As such, Applicant respectfully requests that this rejection be withdrawn and submits that claim 11 is in condition for allowance.

Secondly, in addition to not teaching all the claim elements, there is no suggestion to combine the cited references. The teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, not in applicant's

disclosure. *In re Vaeck*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991); MPEP § 2143. The

Examiner must avoid hindsight. *In re Bond*, 910 F.2d 831, 834, 15 USPQ2d 1566, 1568 (Fed.

Cir. 1990). The Office Action does not cite a passage from Connors, Rodiger, or the Dictionary

of Computing that teaches or suggests combining the teachings of all the references. Without

such a citation, Applicant respectfully submits that the Office Action impermissibly relied on the

Applicant's disclosure and/or impermissible hindsight in forming the rejection of claim 3 under

35 USC § 103 over the cited references.

Thirdly, the fact that references can be combined or modified does not render the

resultant combination obvious unless the prior art also suggests the desirability of the

combination. *In re Mills*, 916 F.2d 680, 16 USPQ2d 1430 (Fed. Cir. 1990); MPEP § 2143.01.

As described above, the Office Action does not point to a passage from the cited references that

would suggest combining the teachings of Connors, Rodiger, and the Dictionary of Computing.

Therefore, Applicant respectfully submits that this rejection is improper and should be

withdrawn.

Claim 7 was rejected under 35 USC § 103(a) as being unpatentable over Connors et al. in

view of Rodiger et al. and further in view of Calder et al. (Journal of Instruction-Level

Parallelism 1 (1999)).

In reference to dependent claim 7 (claim 7 depends indirectly from amended claim 3), as

explained above in the discussion of claim 3, neither Connors nor Rodiger, alone or in

combination, teaches or suggests "for each set-value, combining each of the input register values

into a single value." Therefore, the only way the cited combination (Connors, in view of

Rodiger, in further view of Calder) can teach every limitation of claim 7 is for Calder to teach or

suggest what Connors and Rodiger are lacking. The Office Action does not point to a passage in

Calder that teaches or suggests the above-quoted limitation of claim 7, and Applicant knows of

no such passage. Therefore, Applicant respectfully submits that the cited combination does not

teach or suggest all the elements of claim 7.

Also, regarding dependent claim 7, the Office Action takes Official Notice alleging that it

was known at the time of the invention to base a number of profilings on the expected number of

instances. Applicant respectfully traverses the Office Action's assertion that this information

was well known at the time of the invention and requests that a reference teaching such
information be provided.

Claims 16, 17 and 20-22 were rejected under 35 USC § 103(a) as being unpatentable over
Connors et al. in view of Rodiger et al. and further in view of Calder et al. in view of "Dictionary
of Computing."

Regarding independent claim 16, independent claim 16 has been amended to include the
following limitation: "storing the occurrence frequency of the location-values in a data
structure." As similarly discussed above in the discussion of claim 3, the combination of
Connors, Rodiger, and the Dictionary of Computing does not teach this added claim limitation.
For the cited combination to teach or suggest all the limitations of amended independent claim
16, Calder must teach what the other references (Connors, Rodiger, and the Dictionary of
Computing) are lacking. The Office Action does not point to a passage in Calder that teaches
storing the occurrence frequency of the location-values in a data structure, and Applicant knows
of no such passage. Therefore, the cited combination does not disclose or suggest all the
limitations of amended independent claim 16.

In reference to independent claim 21, claim 21 has been amended to include limitations
similar to those of amended independent claim 16. Applicant respectfully submits that amended
independent claim 21 is allowable for the same reasons that claim 16 is allowable (see discussion
above).

Claims 23 and 27 were rejected under 35 USC § 103(a) as being unpatentable over
Connors et al. in view of Calder et al. In rejecting these independent claims, the Office Action
admits that Connors did not teach profiling top set-values to produce a probability that the reuse
region should be selected, but asserts that Calder teaches utilizing "top values." Calder teaches
tracking the top N values for a register, but does not teach profiling top set-values, as recited in
independent claims 23 and 27. Therefore, neither Calder nor Connors, alone or in combination,
teaches or suggests "profiling top set-values for candidate reuse regions to produce a probability
of top set-values," as recited in independent claims 23 and 27. Thus, Applicant respectfully

submits that the cited combination does not teach or suggest all the limitations of independent claims 23 and claim 27.

Claims 24-26 and 28 were rejected under 35 USC § 103(a) as being unpatentable over Connors et al. in view of Calder et al. and in further view of "Dictionary of Computing." Dependent claims 24-26 and 28 depend from independent claims 23 and 27, respectively. The cited combination cannot teach or suggest all the limitations of dependent claims 24-26 and 28 unless the Dictionary of Computing teaches what Connors and Calder are lacking (see discussion of independent claims 23 and 27 above). The Dictionary of Computing does not teach "profiling top set-values for candidate reuse regions to produce a probability of top set-values," as recited in independent claims 23 and 27. Therefore, for at least this reason, the cited combination does not teach or suggest all of the elements of dependent claims 24-26 and 28.

Claim 13 was rejected under 35 USC § 103(a) as being unpatentable over Connors et al. in view of Rodiger et al. and further in view of "Dictionary of Computing" and in further view of Chang (U.S. 5,933,628). Dependent claim 13 includes all the limitations of claims 11 and 12. The only way for the cited combination to teach or suggest all the elements of claim 13 is for Chang to provide what the other references are lacking (see discussion of claim 11 above). Chang describes a method for identifying hard-to-predict branches to enhance processor performance, but does not teach or suggest "combining each of the input register values into a single value," as claimed in dependent claim 13. Therefore, the cited combination does not teach or suggest all the limitations of claim 13.

Claims 18 and 19 were rejected under 35 USC § 103(a) as being unpatentable over Connors et al. in view of Rodiger et al. and in further view of "Dictionary of Computing" in view of Calder et al. and in further view of Chang. Dependent claims 18 and 19 depend from independent claim 16. The only way for the cited combination to teach or suggest all the elements of claims 18 and 19 is for Chang to provide what the other references are lacking (see discussion of claim 16 above). Chang describes a method for identifying hard-to-predict branches to enhance processor performance, but does not teach or suggest "storing the

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occurrence frequency of the location-values in a data structure" as claimEd in dependent claims 18 and 19. Therefore, the cited combination does not teach or suggest every element of dependent claims 18 and 19.

Newly Added Claims

Claims 29-32 are newly added claims. Applicant respectfully submits that these claims have similar limitations to those discussed above and are allowable for similar reasons.

Conclusion

Applicant respectfully submits that the claims are in condition for allowance and notification to that effect is earnestly requested. The Examiner is invited to telephone Applicant's attorney (612-373-6900) to facilitate prosecution of this application.

If necessary, please charge any additional fees or credit overpayment to Deposit Account No. 19-0743.

Respectfully submitted,

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